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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/518,703
Filing Date: December 20, 2004
Appellant(s): BONNEMANN ET AL.

Kurt G. Briscoe
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/23/2009 appealing from the Office action mailed 2/21/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

NPL: Science, Vol.287, P1989 (2000)	Sun et al	3-2000
5,308,377	Bonnemann et al	5-1994
6,531,304	Bonnemann et al	3-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

Claims 1-2, 5-7, 9 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shouheng Sun et al (NPL: Science, Vol.287, P1989, 2000, thereafter S287) in view of Bonnemann et al (US 5,308,377, thereafter US'377).

Regarding claim 1, S287 teaches a method of synthesizing monodisperse iron-platinum (FePt) nano-particles by reduction of platinum acetylacetonate and decomposition of iron pentacabonyl in the presence of oleic acid and oleyl amine stabilizers (Abstract of S287). FePt is a magnetic material, and iron pentacabonyl is a kind of low-valency metallic compound of the magnetic material. But S287 does not explicitly state: in the presence of an organometallic compound of a Group 13 metal as recited in the instant claim. US'377 teaches a process for the

preparation of finely divided microcrystalline-to-amorphous metal and/or alloy powders or highly dispersed colloids by the reduction of metal salts with alkali metal or alkaline earth metal hydroxides that are kept in a solution with organic solvents by means of specific complex-forming agents (Col.1, Line 9-15). US'377 teaches: using metal salts and preferably the elements of the Groups IVA, IB, IIB, VB, VIB, VIIB and VIIIB of the Periodic Table (Col.2, line 6-36). Compared with the instant invention, US'377 uses a similar organometal agent with the similar metal salts for producing the same metals or metal alloys in powder or colloidal particles (Col.1, Line 51-57). Therefore, it would have been obvious to one of ordinary skill in the art to choose an organometallic compound of Group 13 metal as demonstrated in US'377 in the process of S287 to recover the metal or alloy powder in the pure state with particular advantage by way of a simple filtration from the clear organic solution (col.2, line 37 to col.3, line 11 of US'377).

Regarding claim 2, S287 teaches the FePt particle size is tunable from 3-10 nanometer diameter with a standard deviation of less than 5% (Abstract of S287), which are within the claimed ranges of a mean particle size between 3-15nm and a particle

size distribution with a standard deviation of not more than 1.6nm.

Regarding claims 5-7, S287 further teaches the process including the decomposition of iron pentacabonyl in the presence of oleic acid and oleyl amine stabilizers (Abstract of S287). Iron pentacabonyl is a kind of low-valency metallic compound of the magnetic material as recited in the instant claims.

Regarding claim 9, S287 teaches a thermal decomposition process for the synthesis of iron-platinum nanoparticles (Page 1991, Reference and notes 21 of S287).

Regarding claims 12 and 13, S287 teaches using TEM to determine the FePt magnetic particle size (Fig.1 of S287). S287 teaches the FePt particle size is tunable from 3-10 nanometer diameter with a standard deviation of less than 5% (Abstract of S287), which are within the claimed ranges of a mean particle size between 2-15nm and a particle size distribution with a standard deviation of not more than 1.6nm as recited in the instant claim 12.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over S287 in view of US'377 as applied in claims 1-2, 5-7, 9 and 12-13 and further in view of the admitted prior art (Specification, page 2, Lines 5-13).

Regarding claim 10, which is dependent on claim 1, S287 in view of US'377 teach the limitation of claim 1, and S287 teaches a thermal decomposition process for the synthesis of iron-platinum nanoparticles as discussed in the rejection for claim 9, but S287 does not explicitly state: "the decomposition being effected by photolysis or sonochemically". However "photolysis or sonochemically" would be an obvious alternation to "thermal" method for decomposition as evidenced by applicant's admitted prior art (see specification, page 2, lines 5-13). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the photolysis or sonochemical decomposition for thermal decomposition in the process of S287 in view of US'377, because photolysis decomposition, sonochemical decomposition and thermal decomposition would be functional equivalents in a decomposition process, as evidenced by applicant's admitted prior art, and the substitution would lead to the expected success. See MPEP 2144.06.

Claims 3-4, 8, 11, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over S287 in view of US'377 as applied on claims 1-2, 5-7, 9-10 and 12-13 and further in view of Bonnemann et al (US 6,531,304, thereafter US'304).

Regarding claim 3, S287 in view of US'277 does not explicitly state: "the mean particle size being established by the nature and concentration of the organometallic compound used". US'304 teaches: "a process for modifying the dispersing properties of organometallic-prestabilized or organometallic-pretreated nanometal colloids…" (Abstract of US'304). US'304 teaches that the different organometallic compounds (organoaluminum—$AlMe_3$, $AlEt_3$, AlO_{cts}; $NaAlEt_4$ and MgEt2…) were used in examples 1-14 and different particle size had been obtained (Table 1 of US'304); Compared with the instant invention, US'304 uses a similar organometal agent with the similar metal salts for producing the same metals or metal alloys in a nanometer size scale (examples 1-14 of US'304) as recited in the instant invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose the different organometallic compounds as demonstrated by US'304 in the process of S287 in view of US'377 in order to obtain desired size nanometal particles with modifying dispersing properties (Abstract of US'304).

Regarding claims 4 and 8, S287 in view of US'377 does not explicitly state that the organometallic compound used is an

organoaluminum compound, such as aluminumtrialkyl or an alkylaluminium hydride. However, US'304 teaches these limitations as discussed above.

Regarding claims 11 and 14, S287 teaches heat treatment of FePt nano-particles under a different temperature (450~600°C). But S287 does not explicitly state: "aftertreatment with air". US'304 teaches: Fe colloids can be after treatment with oxygen to form modified protective shells (Col.4, Line 12-15). "Aftertreatment with air" can be an obvious substitute for "aftertreatment with oxygen". Because oxygen and air are functionally equivalent oxidizing atmosphere, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the air for the oxygen in the process of S287 in view of US'377 with expected success. See MPEP 2144.06.

Regarding claim 15-18, they are directed to an intended use of the magnet particles, therefore, they are not a given patentable weight. See MPEP 2111.02 II. Furthermore, US'304 teaches the related applications (Col.3, Line 64 to Col.4, Line 22).

(10) Response to Argument

Appellant's arguments filed on 2/23/2009 with respect to claims 1-18 have been fully considered but they are not persuasive.

Appellant's arguments are summarized as follows:

1. Regarding the rejection for claim 1, 2, 5-7, and 9, in combining Sun et al (S287) and Bonnemann et al (US'377), the Examiner makes a number of fatal errors: A) Appellant agrees that boron and gallium are elements of Group 13 of the Periodic table, however, Appellant disagrees that US'377's teaching are relevant to S287 because US'377 teaches no value of the organoboron or organogallium compound apart from its use as a complexing agent with metal hydrides as a reducing agent complex for metal salts; B) S287 does not use metal hydrides in his process and, therefore, there is no reason apparent on the present record why a person having ordinary skill in the art should employ US'377's complexing agents in 'S287 process; C) there is no apparent reason why persons skilled in the art would have been motivated to US'377's metal hydride complexing agent in S287's non-metal hydride process.

2, Even if a prima facie case of obviousness had been made out-which Appellants do not concede-such is rebutted by the proof of unexpected results—the concentration of the organometallic compound is a result-effective variable determining colloid particle size. Although S287 teaches the FePt particle size is tunable, however, S287 does not teach the use of organometallic compound of group 13. The secondary references are silent on the benefit of particle size and distribution.

3, S287 in view of US'377 does not make out a prima facie case of the obviousness of claims 12 and 13 because the process of S'287 does not utilize metal

hydrides. The subject matters of instant claims are characterized by unexpected results (mean particle size between 2-15nm and a narrow particle size distribution with a standard deviation of not more than 1.6nm) as evidenced by the data in the instant specification.

4, S287 in view of US'377 and allegedly admitted prior art does not make out a prima facie case of the obviousness of claim 10 because S287 in view of US'377 already fails to make out a prima facie case of the obviousness the instant process.

5, S287 in view of US'377 and US'304 does not make out a prima facie case of the obviousness of claims 3, 4, 8, 11, and 14-18 because S287 in view of US'377 already fails to make out a prima facie case of the obviousness the instant process. The subject matters of instant claims are characterized by unexpected results (mean particle size between 2-15nm and a narrow particle size distribution with a standard deviation of not more than 1.6nm) as evidenced by the data in the instant specification.

Examiner responds as follows:

Regarding argument 1, S287 in view US'304 teaches the claimed limitations. Both prior arts teach the similar chemical reduction process for producing the size controlled metal or alloy nanoparticles as claimed in the instant application. Regarding the argument that S287 is a non-metal hydride process, which is incorrect because the reduction of platinum acetylacetonate and decomposition of iron pentacarbonyl as taught by S287 (Abstract of S287) is a metal hydride process. S287 does not explicitly state: in the presence of an organometallic compound of a metal of Group 13 as recited

in the instant claim. However, the secondary reference US'377 teaches: using metal salts and preferably the elements of the Groups IVA, IB, IIB, VB, VIB, VIIB and VIIIB of the Periodic Table (Col.2, line 6-36), which not only cover metals Pt and Fe used in S287, but also include Group 13 elements as recited in the instant claims. US'304 teaches choosing organometallic compound of a metal of Group 13 to recover the metal or alloy powder in the pure state with particular advantage by way of a simple filtration from the clear organic solution (col.2, line 37 to col.3, line 11), which gives a good motivation to apply US'304's technique in the process of S287.

Regarding the unexpected results argument in the arguments 2, 3, and 5, as pointed out in the rejections for the instant claims 2 and 12, S287 teaches the FePt particle size is tunable from 3-10 nanometer diameter with a standard deviation of less than 5% (Abstract of S287), which are within the claimed ranges of a mean particle size between 3-15nm (claim 2) or 2-15nm (claim 12) and a particle size distribution with a standard deviation of not more than 1.6nm as recited in the instant claims. Therefore, the asserted unexpected results are not unexpected results.

Still regarding argument 2, the appellants' arguments are against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, S287 in view of US'377 teaches the limitations of instant claims1, 2, 5-7, and 9. Regarding the argument that the concentration of the organometallic compound is a result-effective variable determining colloid particle size

(see argued in the argument 2), it is noted that S287 teaches the FePt particle size is tunable (Abstract of S287), which meets the claimed colloid particle size.

Regarding arguments 4-6, refer to the response for the argument 1, the prima facie case of obviousness had been made based on the prior arts S287 in view US'304. The admitted prior art is further applied for the instant claim 10, and US'304 is further applied to the instant claims 3, 4, 8, 11, and 14-18, respectively.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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